

PATENT

Attorney Docket No.: WEAT/0080.C2

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**Claims:**

1. A method for profiling a pipe or other hollow tubular article comprising:  
applying a roller system to a part of a pipe bore selected to be profiled,  
wherein the roller system comprises:  
an annular body having a longitudinal bore disposed there-through;  
one or more recesses formed in an outer surface of the body; and  
one or more rollers each mounted on one or more slidable pistons,  
translating the roller system across the bore in a direction including a circumferential component while applying a force to the roller system in a radially outwards direction with respect to a longitudinal axis of the pipe, and  
continually applying and translating until the pipe is plastically deformed substantially into the intended profile.
2. The method of claim 1, wherein the deformation of the pipe is accomplished by radial compression, circumferential stretching, or by a combination of such radial compression and circumferential stretching of the pipe.
3. The method of claim 1, wherein said direction is purely circumferential.
4. The method of claim 2, said direction is partly circumferential and partly longitudinal.
5. The method of claim 1, wherein said roller system is peripherally profiled to be complementary to the profile into which the selected part of the pipe bore is intended to be formed.
6. The method of claim 1, further comprising inserting the roller system into a first end of the pipe and transferring the roller system along the pipe to the selected location.

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7. A method for conjoining two pipes or other hollow tubular articles, comprising:

locating at least a portion of a first pipe within and longitudinally overlapping at least a portion of a second pipe;

applying a roller system to an inner surface of the first pipe at a location where the first and second pipes are to be conjoined, wherein the roller system comprises:

an annular body having a longitudinal bore disposed there-through;

one or more recesses formed in an outer surface of the body; and

one or more rollers each mounted on one or more slidable pistons,

translating the roller system across the bore of the first pipe in a direction including a circumferential component while applying a radially outwardly directed force to the rollers; and

continually applying and translating until the first pipe is plastically deformed into permanent contact with the second pipe and is thereby conjoined thereto.

8. The method of claim 7, wherein said deformation is accomplished by radial compression, circumferential stretching, or by a combination of such radial compression and circumferential stretching of the first pipe.

9. The method of claim 7, wherein said direction is purely circumferential.

10. The method of claim 7, wherein said direction is partly circumferential and partly longitudinal.

11. The method of claim 7, further comprising inserting the roller system into a first end of the first pipe and transferring the roller system to the intended location.

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12. An apparatus for expanding a tubular article, comprising:
  - an annular body having a longitudinal bore disposed there-through;
  - one or more recesses formed in an outer surface of the body; and
  - one or more roller assemblies, each comprising a roller mounted on a slidable piston, wherein each roller assembly is disposed within one of the one or more recesses.
13. The apparatus of claim 12, wherein a first set of one or more roller assemblies are disposed about a first end of the body and a second set of one or more roller assemblies are disposed about a second end of the body.
14. The apparatus of claim 13, wherein rotation axes of the first set of one or more roller assemblies conform to a first regime in which each said rotation axes is substantially parallel to a longitudinal axis of the body in a generally cylindrical configuration.
15. The apparatus of claim 14, wherein rotation axes of the second set of one or more roller assemblies conform to a second regime in which each said rotation axes lies substantially in a respective radial plane including the longitudinal axis of the body and the rotation axes each converge substantially towards a common point substantially on the longitudinal axis of the body in a generally conical configuration.
16. The apparatus of claim 15, wherein rotation axes of a third set of one or more roller assemblies conform to a third regime in which each said rotation axes is similarly skewed with respect to the longitudinal axis of the body in a generally helical configuration which is either non-convergent (cylindrical) or convergent (conical).
17. The apparatus of claim 16, wherein the sets of rollers conform to two or more different ones of the three regimes of roller axis alignments.

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18. The apparatus of claim 17, wherein the apparatus has a set of roller conforming to the second regime located at leading end of the apparatus and another set of rollers conforming to the first regime located elsewhere on the apparatus.

19. The apparatus of claim 12, wherein pressurized fluid within the bore urges the roller assemblies radially outward from the body by exerting a hydraulic force against a first surface of the piston.

20. The apparatus of claim 12, wherein the fluid pressure is applied directly.